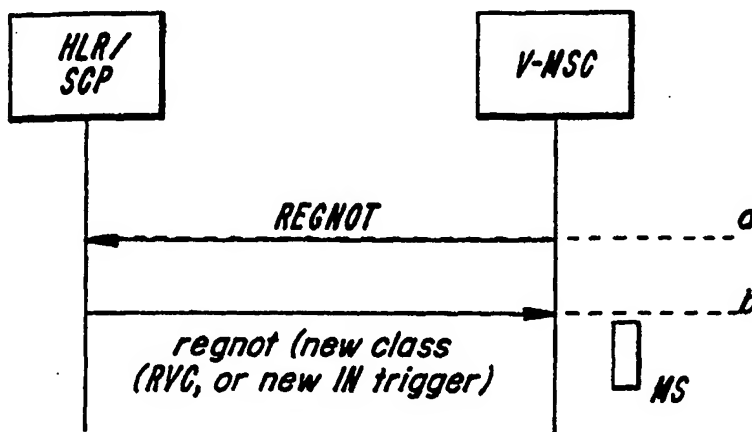




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : H04M 15/28, 15/08	A1	(11) International Publication Number: WO 00/38403 (43) International Publication Date: 29 June 2000 (29.06.00)
(21) International Application Number: PCT/SE99/02287 (22) International Filing Date: 7 December 1999 (07.12.99) (30) Priority Data: 09/218,007 22 December 1998 (22.12.98) US (71) Applicant: TELEFONAKTIEBOLAGET LM ERICSSON (publ) [SE/SE]; S-126 25 Stockholm (SE). (72) Inventors: MADOUR, Lila; Grimson, Kranborsgränd 14, 2tr., S-164 46 Kista (SE). SULTANA, Shabnam; Carlsson, Roskildevägen 1, 2tr., S-164 46 Kista (SE). (74) Agent: NORIN, Klas; Ericsson Radio Systems AB, Common Patent Department, S-164 80 Stockholm (SE).		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>
(54) Title: FLEXIBLE REVERSE CHARGING FOR WIRELESS SUBSCRIBERS		
(57) Abstract Techniques and systems for rate charge reversing in radiocommunication systems are described. Capabilities for charge reversing at initiation of a call or during a call are provided. The reverse charged party is informed of the deviation from standard charging practices and may accept, decline or negotiate the offered billing strategy. This dynamic rate adaptation permits truly per-call rate adaptation in a manner which allows end users to more flexibly allocate costs.		



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakistan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

-1-

FLEXIBLE REVERSE CHARGING FOR WIRELESS SUBSCRIBERS**BACKGROUND**

The present invention generally relates to the field of radiocommunication systems and, more particularly, to techniques and systems for charging for radiocommunication services.

Commercial communication systems and, in particular, cellular radiotelephone systems have experienced explosive growth in the past decade. This growth is due, at least in part, to the improvement in the number and quality of services provided by radiocommunication systems. For example, early systems were designed primarily to support voice communications. However, cellular radiocommunication systems now provide many additional services including, for example, paging, messaging and data communications (e.g., to support Internet communication). Some of these new services make higher throughputs (i.e., than needed for voice communication) very desirable.

As the available types of wireless services and systems become more numerous and sophisticated, users continue to demand different types of capabilities from their wireless devices. One area in which services continue to adapt rapidly is the area of rate charging, i.e., the fees that are charged by wireless network operators to provide radiocommunication service to subscribers. Traditionally, network operators have charged subscribers in various ways. Consider the exemplary architecture depicted in Figure 1 to provide context to the rate charging examples described herein.

Therein, a mobile station (MS) 100 is connected to a radiocommunication system 102 over an air interface to a base station (BS) 104. Signaling over the air interface between MS 100 and BS 104 can occur using any desired protocol, e.g., that standardized in North America in ANSI 136. BS 104 is in turn connected to a mobile switching center (MSC) 106, that may coordinate the activities of a number of base stations, e.g., BS 108 in addition to the base station which serves MS 100. MSC 106 has a home location register (HLR) 110 and visitor location register (VLR) 112 connected thereto. HLRs can be implemented as databases which store data relating to subscribers including, for example, current location of the subscribers' equipment,

-2-

directory number (MSISDN), radio number plan identification (e.g., International Mobile Subscriber Identity (IMSI)), supplementary service profiles and teleservice profiles. Analogously, VLRs store similar data relating to mobile stations which are currently within the radiocommunication service area of an MSC, but whose "home" system is elsewhere. MSC 106 also acts as a gateway between radiocommunication system 102 and the public switched telephone network (PSTN) 114 which coordinates the communication activities of wire-based subscribers, e.g., as represented by plain old telephone set (POTS) 116.

Another radiocommunication system, generally referred to by reference numeral 118, is also shown in Figure 1. Similar nodes are depicted for system 118 without repeating the above description, for simplicity. For the purposes of the ensuing rate charging examples, it is sufficient to note that another mobile station 120 is connected to system 118. As will be appreciated by those skilled in the art, each radiocommunication system 102 and 118 may include additional MSCs, HLRs, VLRs and base stations. Moreover, the radiocommunication systems 102 and 118 may be directly interconnected, e.g., via one or more communication links operating using an intersystem protocol (such as that described in ANSI-41) to permit direct interaction and service overlap between the two radiocommunication systems.

If MS 100 (calling party) places a call to MS 120 (called party), there are several conventional ways in which billing may occur. For example, in some systems the calling party pays for services provided by the originating resource (e.g., BS 104, MSC 106, etc.), while the called party pays for services provided by the terminating resource (e.g., the corresponding BS and MSC in system 118). However, it is desirable to permit subscribers to have some ability to selectively adjust the manner in which radiocommunication services are billed. For example, conventional wire-based telephone service provides for so-called "collect" calls on which basis a called party can, at his or her option, pay charges associated with a call from an identified calling party.

One idea for adding flexibility to the charging policies of network operator is to permit a call to be charged to either the calling or the called party on a call-by-call basis

-3-

as set forth in U.S. Patent No. 5,557,664 to Burns et al. Therein, when a call is initiated, a database is queried to determine which party is to pay the airtime charges. For example, a processor can use the number dialed by the calling party to query the database. If the called party has subscribed to a "calling party pays" service, then the processor causes an announcement regarding the pricing of the call to be played to the calling party. When the calling party agrees to pay for the airtime charges, the processor signals the involved MSCs so that billing records are updated appropriately.

This solution, however, requires a subscriber to change his or her service setting in the database each time he or she wishes to accept or reverse charges. Accordingly, it would be desirable to provide systems and techniques that more flexibly permit called or calling parties to negotiate which party will pay for any particular call at the time that the call is initiated or later on after the call has been established.

SUMMARY

These, and other, drawbacks, limitations and problems associated with conventional rate charging systems and techniques are overcome according to exemplary embodiments of the present invention, wherein the called party or the calling party can invoke reverse charging/charge negotiation either at the beginning of a call or during a call. According to one exemplary embodiment of the present invention, this service can be activated by the calling party adding some additional digits as a prefix or suffix to the dialed number. Then, the system can inform the called party that the charges for, e.g., airtime, will all be reversed charged to his account, unless he or she declines the connection. The system can inform the called party in many ways, e.g., by tone, audio announcement, text displayed message (e.g., via SMS), etc., of the deviation from standard charging practice.

Reverse charging can also be invoked by the called party, in which case the calling party is informed and provided with an opportunity to decline the connection. Moreover, this inventive service, method and system permits either the calling or called party to invoke the service during the call.

-4-

Another aspect of the present invention is charge negotiation. If a party receives a message indicating that a call is to be setup with reverse charging, or if a party associated with an ongoing call receives an indication that reverse charging is to be implemented, then the party receiving the indication may conditionally accept reverse charging with a restriction. For example, the restriction may be imposed as a limit on the amount, e.g., in terms of time or money, that the reverse charged party is willing to expend paying for the connection. This restriction can then be conveyed to the party which imposed the reverse charging. Alternatively, the party imposing the reverse charging can be informed when the limit is reached, i.e., when normal charging is to be restored because the reverse charged party is no longer willing to pay. When a restriction is imposed, an appropriate notification mechanism (e.g., tone, voice or display) is used to inform the reverse charged party.

BRIEF DESCRIPTION OF THE DRAWINGS

Other features and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

FIG. 1 is a block diagram of an exemplary communication system in which reverse charging and charge negotiation according to the present invention can be implemented;

FIG. 2 is a signaling diagram depicting activation of a reverse charging/charge negotiation service according to an exemplary embodiment of the present invention;

FIG. 3 is a flowchart illustrating a method for performing reverse charging/charge negotiation according to an exemplary embodiment of the present invention;

FIG. 4 is a signaling diagram illustrating signals between nodes in a communication system associated with an exemplary reverse charging/charge negotiating technique between two mobile stations; and

-5-

FIG. 5 is a signaling diagram illustrating signals between nodes in a communication system associated with an exemplary reverse charging/charge negotiating technique between a mobile station and a terminal that is connected to a wire-based communication system.

5

DETAILED DESCRIPTION

In the following description, for purposes of explanation and not limitation, specific details are set forth, such as particular circuits, circuit components, techniques, etc. in order to provide a thorough understanding of the present invention. However, it
10 will be apparent to one skilled in the art that the present invention may be practiced in other embodiments that depart from these specific details. In other instances, detailed descriptions of well-known methods, devices, and circuits are omitted so as not to obscure the description of the present invention.

The exemplary radio communication systems discussed herein are described as
15 using the time division multiple access (TDMA) protocol, in which communication between the base station and the mobile terminals is performed over a number of time slots. However, those skilled in the art will appreciate that the concepts disclosed herein find use in other protocols, including, but not limited to, frequency division multiple access (FDMA), code division multiple access (CDMA), the recently
20 developed "Bluetooth" technology, or some hybrid of any of the above protocols. Bluetooth is a universal radio interface in the 2.45 GHz frequency band that enables portable electronic devices to connect and communicate wirelessly via short-range, ad hoc networks. Readers interested in various details regarding the Bluetooth technology are referred to the article entitled "BLUETOOTH -- The universal radio interface for
25 ad hoc, wireless connectivity" authored by Jaap Haartsen and found in the Ericsson Review, Telecommunications Technology Journal No. 3, 1998, the disclosure of which is incorporated here by reference. Likewise, some of the exemplary embodiments provide illustrative examples relating to the ANSI 41 compliant systems, however, the techniques described herein are equally applicable to any intersystem or intrasystem
30 signaling protocols, e.g., wireless local area network (WLAN).

-6-

According to exemplary embodiments of the present invention, a reverse charging selection can be invoked by either the calling party or the called party (or parties if multiple called parties exist, i.e., in a group call) when the call is initiated or at any time during the call. If reverse charging is invoked during an ongoing call, then the charging record for both parties involved will be marked and time stamped with the relevant information. Moreover, the present invention provides techniques and systems which permit the called and calling party to negotiate which party will pay for the call. The inventive techniques can themselves be considered a service or bundle of services (referred to herein as "charge negotiation services") to which a subscriber may optionally subscribe.

Charge negotiation services can be associated with specific subscribers in a number of ways. For example, this service can be added to a subscriber profile (e.g., as a new class in the HLR/VLR/service control point (SCP) nodes) and triggered when the subscriber's profile is checked. Alternatively, charge negotiation services can be associated with a particular subscriber by way of an Intelligent Network (IN) trigger. Those skilled in the art will appreciate that IN triggers are parameters specified in ANSI41 for the type of calls that an MS is permitted to originate and also defines the termination triggers that are currently active for the subscriber (e.g., routing failure, no page response, etc.). Using either of these techniques to associate subscribers with charge negotiation services according to the present invention results in such services always being triggered during calls placed or received by such subscribers.

Yet another alternative is to associate charge negotiation services with a subscriber on a per call basis (i.e., when invoked). This can be accomplished by using in-band signaling (e.g., Dual Tone Multi Frequency tones) which trigger service interaction management with an HLR/ SCP/Intelligent Peripheral (IP), e.g., by dialing a prefix or suffix in addition to the called number or entering a short code during a connection. Figure 2 is a signaling diagram which illustrates how the subscriber profile update process can associate the charge negotiation service with a subscriber as part of the registration process. This figure will now be described in the context of the nodes illustrated in Figure 1.

-7-

Therein, assuming that MS 100's home system is radiocommunication system 118 and MS 100 is thus roaming in system 102, at initial registration the visited MSC 106 sends a registration notification invoke (REGNOT) message to the HLR of system 118. The HLR responds with a message including the profile of the roaming MS 100.

- 5 This profile indicates, for example, that the new charge negotiation service class (RVC) is permitted and active for the subscriber of MS 100.

If the charge negotiation service is implemented as an IN service, the HLR/SCP will include a new indicator flag in the IN triggers parameter to indicate that any calls initiated by this subscriber will be reverse charged to the called party. The IN service
10 can also indicate different levels of reverse charging with restriction, each restriction could be indicated by a different flag, which restrictions are described more fully below.

Having described how services according to the present invention can be associated with subscribers, a brief overview of an exemplary method for actually
15 invoking such services according to the present invention will now be described with respect to Figure 3. In this exemplary embodiment, the calling party invokes the reverse charging function at step 300 causing the called party to pay for the call. The same or corresponding steps can be performed when the called party invokes this service. When invoked by the calling party, i.e., where the called party will have to
20 pay, the service could be triggered by performing per call activation, e.g., by dialing a specific short code, adding a prefix or a suffix to the dialed digits or by checking the subscriber profile for each call.

The party that is being reverse charged can be notified at step 302 by one or a combination of the following methods: text messages (e.g., using the short message
25 service (SMS) on the traffic channel, session interactive display notification), by an audio announcement (e.g., using an SMS-to-voice converter), by a tone emanating from the mobile station or by Internet messaging if the MS is engaged in a packet data call. Notification procedures such as alerting the MS using defacto standards as defined, for example, in the ANSI136 air interface standard, or session information packet data
30 could be used to inform the involved party that is being reverse charged. An example

-8-

of notification on the current active session can be a Pop up display with the restriction information, an agent chat window iconized on the user screen interacting/negotiating (based on accumulated charges incurred by the user) on behalf of the user and informing the user of the incoming call and the conditions associated with it (e.g., total
5 current charges and the possible consequences of accepting the reverse charge, etc.). The agent can be preprogrammed by the user to negotiate based on a set of guidelines input by the user. Regardless of the mechanism used to notify the called party of the change from normal billing procedures, some form of acknowledgment or opportunity to decline the call should be included.

10 The party being reverse charged may (step 304) choose to accept, decline, or negotiate the offer by the other party to establish the connection with reversed charges. If the notified party, in this example the called party accepts the offer, then the flow moves to step 306, the call is set-up and the respective MSCs are instructed to adjust their billing/record functions on the basis of a reversal of charges. If the notified party
15 declines the offer to set-up the call predicated on a reversal of charges, he or she may, for example, opt to end the negotiation, after which the call will not be set-up at step 308. Alternatively, the declining party may opt to wait at step 308 and permit the calling party to continue the negotiations, e.g., by continuing the call using the standard cost allocation scheme at step 309. Mechanisms which permit the notified party to
20 decline the offer can be similar to those used to notify of the reversal of charges. For example, an audio announcement (using, for example, the remote user interaction) may be output from a speaker in the MS announcing that the user should "Press 1 to accept, 2 to decline", etc.. The MS can package the notified user's input (1 or 2) in an appropriate message (e.g., SMS or FlashInfo) for transmission over the air interface
25 whereupon it will be interpreted by the system for appropriate action. If the called party declines the offer by the calling party, then the calling party will be notified that the call cannot be set-up.

The called party may also opt to negotiate the charging mechanism with the calling party. The charge rate negotiation can take many forms. For example, the
30 called party can indicate that reversed charges are acceptable, however with a

-9-

restriction or limitation placed thereon at step 310. Examples of reverse charging restrictions include restricting the amount of charging that is accepted by duration (e.g. 5 minutes maximum), or by some fixed allowable charge (e.g., limit charge to \$20 maximum). As with the initial notification of reverse charging, the negotiation can take
5 place using any suitable mechanism, e.g., SMS messaging. If the parties agree on a suitable charging strategy for a particular call which includes a restriction on the reverse charging (time or monetary amount), then the party that reversed charged the call would be notified when the restriction is in effect and/or when the limit was reached or about to be reached.

10 Figure 4 depicts a more detailed, yet still exemplary, information flow for the reverse charged service invoked by a calling party using the ANSI41 protocols wherein the called party accepts with a restriction, i.e., wherein the flow proceeds to block 310 of Figure 4. Those skilled in the art will appreciate that signaling protocols other than ANSI41 could be used to implement embodiments of the present invention, e.g., GSM
15 MAP techniques. In describing the signaling illustrated in Figure 4, reference is made to the reference letters a-h printed on the far right-hand side thereof.

a. The calling party (MS-1) originates a call to the called party (MS-2) from the originating MSC (O-MSC). Depending on the technique employed to invoke reverse charging according to the present invention, the O-MSC either analyzes the
20 digits received from the calling party (i.e., looking for the RVC prefix), or checks the calling party profile (assuming MS-1 previously registered with RVC class allowed and active). The O-MSC launches a modified, ANSI41 specified, LocationRequest message to the HLR, including information regarding the calling party and information that the call is to be reverse charged to the called party.

25 b. The HLR verifies the location of the called party (MS-2) and launches a modified, ANSI41 specified, Routing Request invoke message, including an indication for notifying the called party that the call will be fully charged to his/her account. The notification could take different forms as described above and may be performed on a control channel if the notification is provided prior to call setup. Following call setup,
30 the notification will be carried on the traffic channel. If the called party (MS-2) is busy

-10-

on a packet data call, an internet message can be used and the RVC indication and the calling party information will be displayed to the called party.

- c-f. The scenario continues with, in this example, the RVC notification being provided to the called party at the alert message. The V-MSC returns the temporary
- 5 local directory number (TLDN) to the HLR which forwards the information to the originating MSC in the locreq message. The call is then setup. MS-2 is notified that the call is reverse charged and, in this example, MS-2 accepts with a restriction by dialing a special feature code to indicate the desired type of restriction. For example, the called party can use the keypad (not shown) of MS-2 to dial the digits: FC+time (if
- 10 the called party accepts the charges for a certain amount of time) or FC+money (if the called party accepts the charges up to a certain amount of money). The called mobile station can use a flash message as defined on the air interface to invoke the restriction feature. The digits included in the flash message can then be analyzed by the V-MSC, which will result in triggering a FeatureRequest message at step e. This procedure can
- 15 be performed at any time after the call has been established.

- The HLR/SCP receives the Feature Request message and starts the supervision function for the restriction. Alternatively, as mentioned earlier, it is also possible that the HLR/SCP immediately informs the originating MSC about the restriction and that the O-MSC, in turn, informs the calling party. If this alternative is employed, then
- 20 supervision of the restriction will occur in the O-MSC instead of the HLR/SCP of the V-MSC. However, this exemplary scenario describes supervision in the HLR/SCP. When the supervision function indicates that the restriction has timed out, either based on time or money expiring, the calling party is informed that he/she is now going to be charged. Alternatively, the called party may then reverse charge the call to the calling
- 25 party after the restriction expires by entering a different feature code into his or her mobile station.

g-h: Signaling line g depicts the step wherein the calling party is informed that the restriction has expired, i.e., the originating MSC receives information from the V-MSC that charging has been altered for the ongoing call. The new information

-11-

included in the message from the HLR/SCP indicates whether the ongoing call is now going to be:

- Charged normally (e.g., wherein calling and called party sharing the charges);
- 5 • Reverse charged with no restriction (e.g., calling party handling all the charges);
- Reverse charged for X minutes (e.g., calling party handling all the charges for X minutes);
- Reverse charged for X amount of money (e.g., calling party handling all the charges for X amount of money).
- 10

As mentioned above, the calling party could then negotiate with the called party via, for example, SMS messaging. If the called party changes the restriction, a new Feature Request message can be triggered which will indicate the intentions of the called party.

- 15 Any time during the duration of the call, the called party could invoke reverse charging or alter the reverse charging restriction status by dialing the proper feature code. This will cause the mobile switching center to trigger a feature request to the HLR/SCP. The handling of the feature will be identical to that described above with respect to signaling lines e-h.

- 20 The foregoing example has been described in the context of a first mobile station, e.g., MS 100, negotiating rate charging with a second mobile station, e.g., MS 120. To provide another example of how reverse charging and negotiated rate charging can be implemented according to the present invention, consider the following example described in a scenario wherein one of the parties is using a wire-based terminal. A
- 25 corresponding signaling diagram for this example can be found in Figure 5. In this example, the called mobile subscriber reverse charges the call to the originating PSTN subscriber based on the calling party number presentation after the call is setup.

- a-d. A call is originated from a fixed network to a wireless subscriber who has the RVC feature active (e.g., as a result of checking his or her subscriber profile during
- 30 registration). As in the foregoing example, the routing information needed to setup the

-12-

call to MS-2 is obtained by this series of signals between the G-MSC, HLR/SCP and V-MSC.

e-f. In this case, the fixed network subscriber's number (i.e., the so-called "A-number") is presented to the called party who, based on this information, decides to reverse charge the call by using a special feature code, e.g., by typing a special keypad combination into the MS's keypad. The serving system (V-MSC and HLR/SCP) analyzes the code and performs, for example, one of the following to notify the calling party in the PSTN that the call is being reverse charged to his/her account:

- Generate in-band signaling (e.g, DTMF tones);
- 10 • Trigger an inter-system message such as a modified ANSI41 Information-Forward message currently used during inter-system handoff operation, or an ANSI41 RedirectionRequest message. Alternatively, a new ANSI41 message could be created to handle this feature. The gateway MSC will take the information received from the message and map it into an ISDN User Part (ISUP) message that will carry the information to the PSTN;
- 15 • Generate an ISUP message from the visited MSC to the PSTN (through the gateway MSC) that invokes the service.

Assuming that the reverse charging is accepted by the fixed system subscriber, a message is returned to the V-MSC indicating acceptance as shown in Figure 5.

Various of the afore-described exemplary embodiments use modified ANSI41 messages to perform some of the signaling involved in reverse charging and rate negotiation according to the present invention. For completeness in this description, More specifically, in this exemplary implementation, the following ANSI41 messages can be modified (i.e., have parameters added thereto) as described below in order to support wireless reverse charging according to the present invention:

InformationForward, InformationDirective, RegistrationNotification return result, QualificationRequest return result, QualificationDirective Invoke, LocationRequest Invoke, Origination Request Invoke, Routing Request Invoke, Transfer to Number Request Invoke.

-13-

RegistrationNotification Return Result:

RVC class in the profile parameter or

New IN trigger indicator

QualificationRequest Return Result:

5 RVC class in the profile parameter or

New IN trigger indicator

QualificationDirective Invoke:

RVC class in the profile parameter or

New IN trigger indicator

10 **LocationRequest Invoke:**

RVC indicator (used to indicate reverse charge to the called party number)

Calling party info (existing and required)

RoutingRequest Invoke:

RVC notification indicator (to indicate what type of notification to be used when the

15 calls are reverse charged). The type of notification could be selected by the subscriber, and could also be part of the profile: (tone, announcement, SMS, etc.)

InformationDirective Invoke:

RVC status change:

- Charged normally
 - 20 • Reverse charge with no restriction
 - Reverse charge for X minutes
 - Reverse charge for X money (local currency converted by for eg. SCP) and
- RVC notification indicator: same as above

InformationForward Invoke:

25 RVC notification indicator

RVC status change

Redirectionrequest Invoke:

RVC notification indicator

RVC status change

30 **Remote user interaction Invoke:**

-14-

RVC status change:

- Charged normally
 - Reverse charge with no restriction
 - Reverse charge for X minutes
 - 5 • Reverse charge for X money (local currency converted by for eg. SCP)
- and RVC notification indicator: same as above

Services according to the present invention can also be combined with other system features. For example, in the event that the status of the reverse charge service is modified during the call, and the party that must be notified had initiated an inter-system handoff, the anchor or the serving system (depending on where the change of status would occur) would forward the relevant information using a modified inter-system message such as InformationForward. Likewise, the party initiating the change may do so during or after performing an inter-system handoff. The feature codes followed by the restriction can be sent to the anchor system using, for example, a flash request message. These feature codes (digits) can then be analyzed by the anchor system in the same way as described above during call setup. As mentioned earlier, this reverse charging/charge negotiation service could be IN based as well, in which case, other IN messages could be modified to develop this feature within the SCP (e.g., restriction of reverse charging from the calling party could be handled in the SCP.)

Although the invention has been described and illustrated with reference to specific embodiments thereof, it is not intended that the invention be limited to these illustrative embodiments. For example, services and systems according to the present invention could also be used in a multiparty call scenario where any party involved in the call can use, e.g., in-band DTMF signaling to invoke reverse charging between the controlling and any other of the involved parties. For example, the party to be charged in the multiparty call could be identified by adding that party's phone number to the request to invoke the reverse charging service. Moreover, for end customers billing and resolving information exchange, charging consolidation could be performed statically through operator administration or dynamically through appropriate Network-

-15-

Network Interface (NNI) signaling. Thus, those skilled in the art will recognize that modifications and variations can be made without departing from the spirit of the invention.

-16-

What is claimed is:

1. A method for processing a call between a called party and a calling party in a communication system having at least one wireless link comprising the steps of:
 - 5 establishing a call between said calling party and said called party;
 - electing, by an electing party being either said calling party or said called party, to implement a change to a predetermined cost allocation scheme;
 - informing the other party of said change using a signal transmitted, at least in part, over said at least one wireless link; and
 - 10 selectively accepting, by said other party, said changed cost allocation scheme.
2. The method of claim 1, wherein said step of selectively accepting further comprises the step of:
 - 15 accepting said changed cost allocation with a restriction.
3. The method of claim 2, wherein said restriction includes a limit on a duration of said changed cost allocation scheme.
- 20 4. The method of claim 3, wherein said limit is set in terms of time.
5. The method of claim 3, wherein said limit is set in terms of money.
6. The method of claim 1, wherein said step of electing further comprises:
 - 25 electing to implement said change during call set-up.
7. The method of claim 1, wherein said step of electing further comprises:
 - electing to implement said change after call set-up.

30

-17-

8. The method of claim 1, wherein said step of electing further comprises the step of:

electing to implement said change after an intersystem handoff.

5 9. The method of claim 2, further comprising the step of:
informing said electing party of said restriction.

10 10. The method of claim 2, further comprising the step of:
informing said electing party that said predetermined cost allocation
scheme is being reinstated after a limit imposed by said restriction is reached.

11. The method of claim 1, wherein said step of establishing further
comprises the step of:
establishing a packet data call between said calling party and said called
15 party.

12. The method of claim 11, wherein said step of informing further
comprises the step of:
using Internet messaging to inform said other party of said change.
20

13. The method of claim 1, wherein said step of selectively accepting further
comprises the step of:
sending, by said other party, a message to said electing party to negotiate
said change.
25

14. The method of claim 13, wherein said step of sending further comprises
the step of:
sending, as said message, a different cost allocation scheme than that
proposed by said electing party.
30

-18-

15. The method of claim 13, wherein said message includes a limit on a duration of said changed cost allocation scheme.

16. The method of claim 15, wherein said limit is set in terms of time.

5

17. The method of claim 15, wherein said limit is set in terms of money.

18. The method of claim 13, further comprising the step of:
continuing said call only if said negotiation is successful.

10

19. The method of claim 13, wherein said step of sending said message to negotiate said change further comprises the step of:
employing a software agent within one of said other party's subscriber equipment to perform said negotiation.

15

20. A radiocommunication system for processing a call between a called party and a calling party comprising:
means for establishing a call between said calling party and said called party;
means for electing, by an electing party being either said calling party or said called party, to implement a change to a predetermined cost allocation scheme;
means for informing the other party of said change using a signal transmitted, at least in part, over at least one wireless link; and
means for selectively accepting, by said other party, said changed cost allocation scheme.

20

25

21. The system of claim 20, wherein said means for selectively accepting further comprises:
means for accepting said changed cost allocation with a restriction.

30

-19-

22. The system of claim 21, wherein said restriction includes a limit on a duration of said changed cost allocation scheme.

23. The system of claim 22, wherein said limit is set in terms of time.

5

24. The system of claim 22, wherein said limit is set in terms of money.

25. The system of claim 20, wherein said means for electing further comprises:

10

means for electing to implement said change during call set-up.

26. The system of claim 20, wherein said means for electing further comprises:

15

means for electing to implement said change after call set-up.

27. The system of claim 20, wherein said means for electing further comprises:

20

means for electing to implement said change after an intersystem handoff.

28. The system of claim 21, further comprising:
means for informing said electing party of said restriction.

25

29. The system of claim 21, further comprising:
means for informing said electing party that said predetermined cost allocation scheme is being reinstated after a limit imposed by said restriction is reached.

30. The system of claim 20, wherein said means for establishing further comprises:

-20-

means for establishing a packet data call between said calling party and said called party.

31. The system of claim 30, wherein said means for informing further
5 comprises:

means for using Internet messaging to inform said other party of said change.

32. The system of claim 20, wherein said means for selectively accepting
10 further comprises:

means for sending, by said other party, a message to said electing party to negotiate said change.

33. The system of claim 32, wherein said means for sending further
15 comprises:

means for sending, as said message, a different cost allocation scheme than that proposed by said electing party.

34. The system of claim 32, wherein said message includes a limit on a
20 duration of said changed cost allocation scheme.

35. The system of claim 34, wherein said limit is set in terms of time.

36. The system of claim 34, wherein said limit is set in terms of money.
25

37. The system of claim 32, further comprising:
means for continuing said call only if said negotiation is successful.

38. The system of claim 32, wherein said means for sending said message to
30 negotiate said change further comprises:

-21-

means for employing a software agent within one of said other party's subscriber equipment to perform said negotiation.

5

1/5

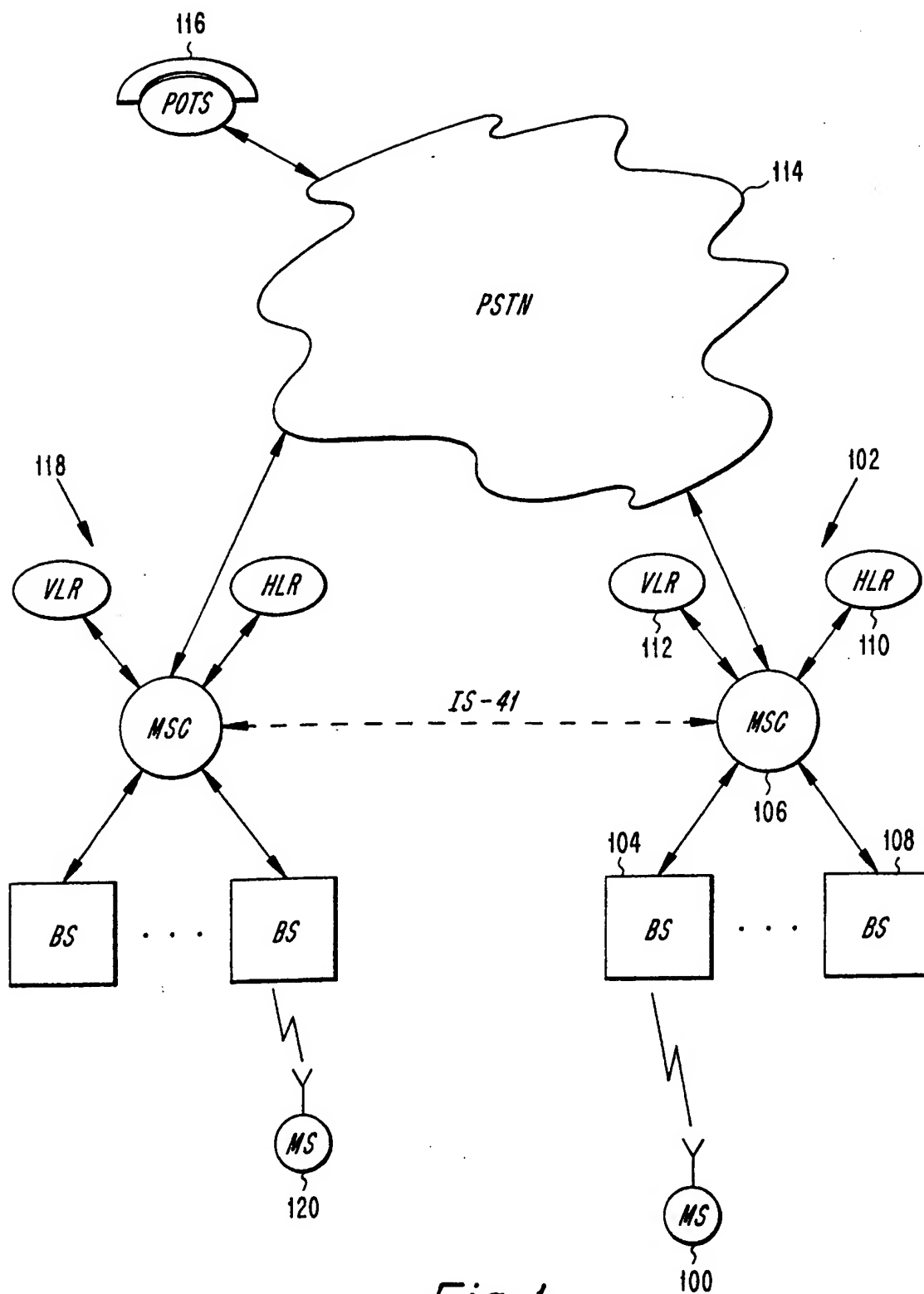
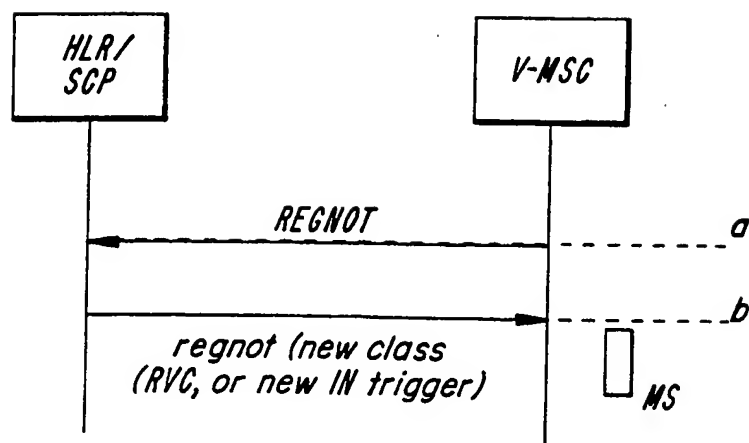


Fig. 1

2/5

*Fig. 2*

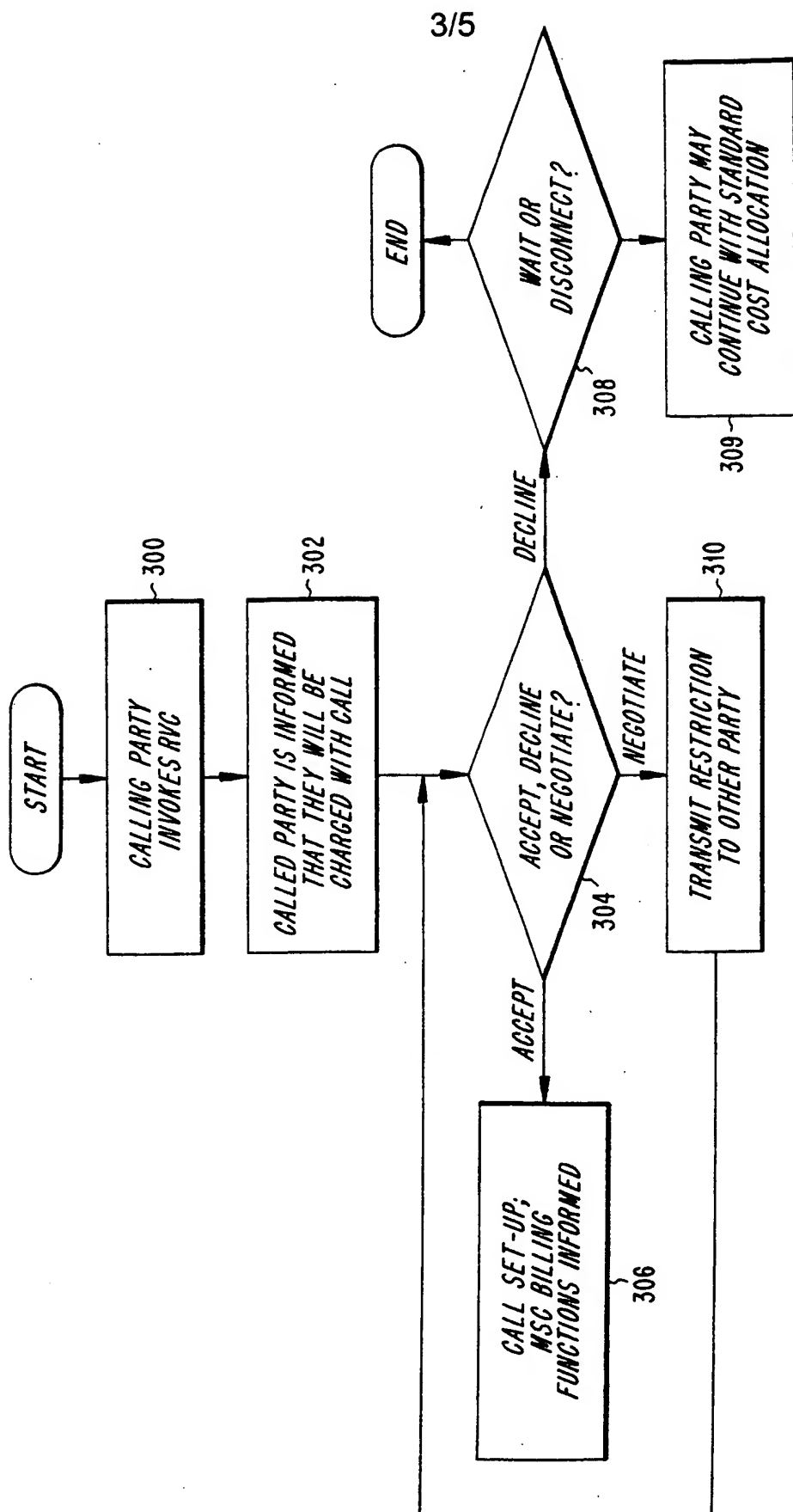


Fig. 3

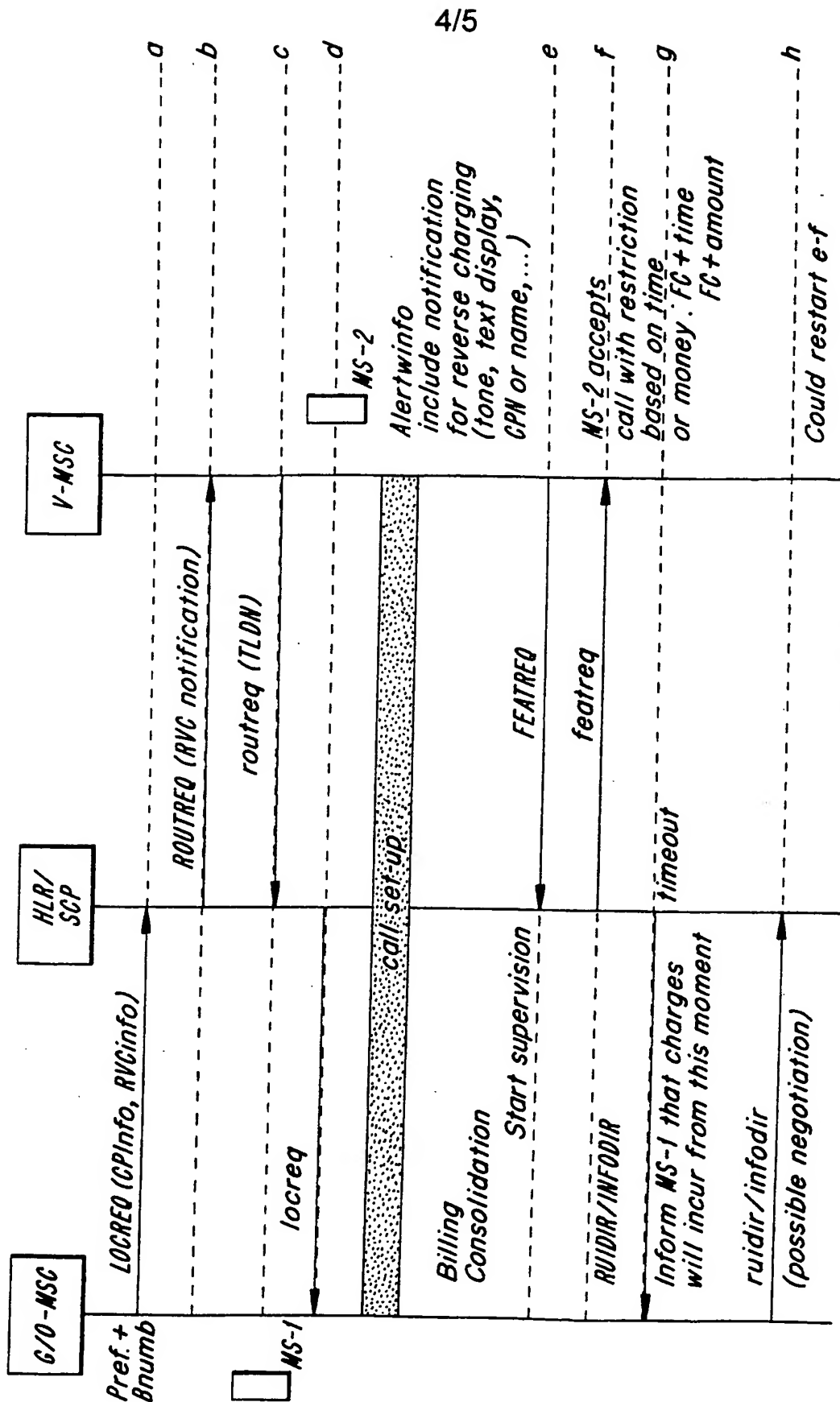


Fig. 4

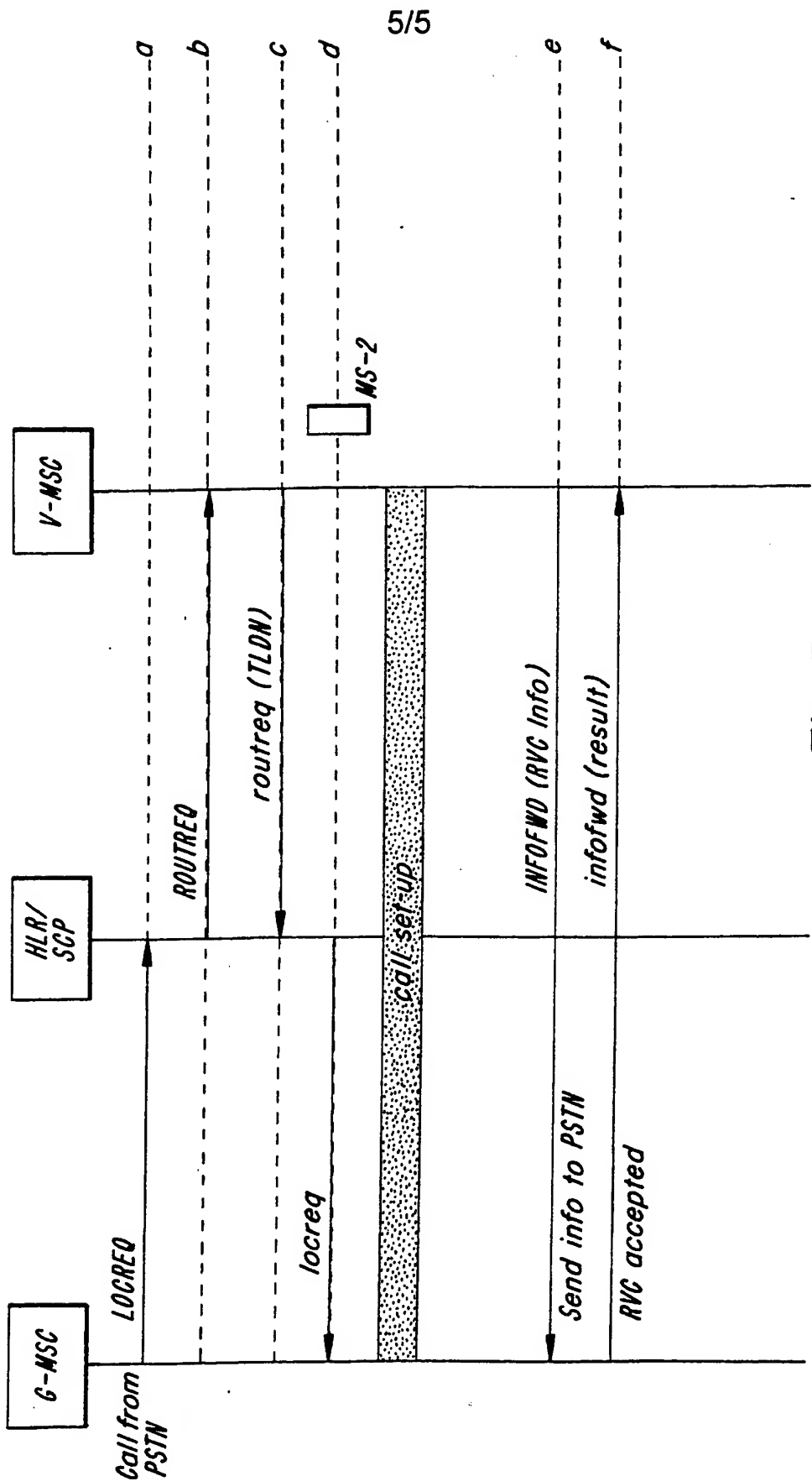


Fig. 5

INTERNATIONAL SEARCH REPORT

Intern. Application No

PCT/SE 99/02287

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 H04M15/28 H04M15/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 602 907 A (HATA EMI ET AL) 11 February 1997 (1997-02-11)	1,2,7,9, 11,13, 14,18, 20,21, 26,28, 30,32, 33,37
Y	column 2, line 51 - column 3, line 55 column 19, line 50 - line 53 claims 1-3	3-6
Y	PATENT ABSTRACTS OF JAPAN vol. 012, no. 049 (E-582), 13 February 1988 (1988-02-13) & JP 62 196969 A (MITSUBISHI ELECTRIC CORP), 31 August 1987 (1987-08-31) abstract	3-6
	-/-	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"A" document member of the same patent family

Date of the actual completion of the international search

8 March 2000

Date of mailing of the international search report

15/03/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentkan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
 Fax (+31-70) 340-3016

Authorized officer

Neves Appelt, D

INTERNATIONAL SEARCH REPORT

Intern. Application No

PCT/SE 99/02287

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 381 467 A (ROSINSKI RICHARD R ET AL) 10 January 1995 (1995-01-10) column 6, line 23 -column 7, line 50 column 14, line 61 -column 15, line 62	1-3,6,7, 9,20-22, 25,26,28
Y	US 5 754 633 A (ROBERT BERGMAN LEVY) 19 May 1998 (1998-05-19) column 1, line 9 - line 62 column 5, line 18 - line 47 claims 1,6	1-3,6,7, 9,20-22, 25,26,28
X	WO 96 03000 A (BRITISH TELECOMM ;SWALE RICHARD PAUL (GB); ANDERSON JOHN ROLAND (G) 1 February 1996 (1996-02-01) page 2, line 21 - line 31 page 5, line 19 -page 6, line 6	1-4,7,9, 20-23, 26,28
A	WO 98 54920 A (ERICSSON GE MOBILE INC) 3 December 1998 (1998-12-03) claim 1	1
A	PATENT ABSTRACTS OF JAPAN vol. 095, no. 001, 28 February 1995 (1995-02-28) & JP 06 296205 A (FUJITSU LTD;OTHERS: 01), 21 October 1994 (1994-10-21) abstract	1
A	PATENT ABSTRACTS OF JAPAN vol. 096, no. 003, 29 March 1996 (1996-03-29) & JP 07 307814 A (NEC CORP), 21 November 1995 (1995-11-21) abstract	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/SE 99/02287

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5602907	A	11-02-1997	JP 7212500 A	11-08-1995
JP 62196969	A	31-08-1987	NONE	
US 5381467	A	10-01-1995	CA 2101305 A,C	01-05-1994
US 5754633	A	19-05-1998	NONE	
WO 9603000	A	01-02-1996	AU 682779 B	16-10-1997
			AU 2932795 A	16-02-1996
			CA 2196325 A	01-02-1996
			CN 1157681 A	20-08-1997
			DE 69502953 D	16-07-1998
			DE 69502953 T	12-11-1998
			EP 0770299 A	02-05-1997
			ES 2117870 T	16-08-1998
			FI 970135 A	14-01-1997
			HK 1012171 A	23-07-1999
			JP 10502781 T	10-03-1998
			NO 970143 A	13-03-1997
			NZ 289470 A	26-02-1998
			US 5822411 A	13-10-1998
WO 9854920	A	03-12-1998	AU 7707798 A	30-12-1998
JP 06296205	A	21-10-1994	NONE	
JP 07307814	A	21-11-1995	NONE	

THIS PAGE BLANK (USPTO)

**ORIGINAL
NO MARGINALIA**

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☒ FADED TEXT OR DRAWING
- ☐ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☐ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.

THIS PAGE BLANK (USPTO)